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ABSTRACT

An approach to educational research that is receiving renewed attention is participatory action research (PAR), which emphasizes a bottom-up approach to research as well as useful outcomes. PAR is a philosophy, and not a methodology per se. It is a deliberate, goal-directed, structured, and applied means of obtaining information that looks to informants as active participants in the evaluation and research process. The generalizability of findings is deemphasized in favor of localized, individually meaningful action outcomes. PAR emerges from sociology and social/cultural anthropology, and can use mixed methods and any design in which evaluation/research is participant directed. Several examples are given of the PAR approach. Appendix A describes a program evaluation conducted at the Department of Science and Engineering Support at the National Technical Institute for the Deaf (NTID) of the Rochester (New York) Institute of Technology involving 56 students. The survey instrument is included. Appendix B describes an interview study in which staff at the Instructional Design and Evaluation Department of the NTID were asked about the quality of instructional materials and the data were used to create guidelines and checklists for project planning and development. Appendix C contains a report on the development of instructional materials for two courses at the NTID. (SLD)

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Participatory Action Research (PAR):

What it Is, What it Isn't, How it's Done, What You Get

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Participatory Action Research (PAR):

What it Is, What it Isn't, How it's Done, What You Get

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There has recently been a confluence of several trends that suggest some new attention be given to our old ways of approaching educational research. One of these trends is a heightened tension between pure and applied science. Another is consumerism -- i.e. consumer-driven or consumer-responsive research, programming, etc.). Third, the detached, analytical researcher studying human relations from the laboratory is rapidly becoming out of favor. New ways are being called for and educational researchers are rising to the challenge.

One approach receiving renewed attention is **participatory action research** or PAR (as in being on equal par). While two earlier Division D presentations (Scherer & McKee, 1991; 1992) discussed the results and outcomes of PAR efforts, PAR itself was not the focus of the presentations.

PAR emphasizes a bottom-up approach to research and emphasizes useful outcomes. According to W.F. Whyte, "It is important, both for the advancement of science and for the improvement of human welfare, to devise strategies in which research and action are closely linked" (1991, p. 8).

What PAR Is

PAR is philosophy, and not a methodology per se. It is a deliberate, goal-directed, structured and applied means of obtaining information -- one that looks to informants not as passive providers of information but as active participants in the evaluation/research process. PAR de-emphasizes the "generalizeability of findings" in favor of localized, individually meaningful action outcomes.

The current interest in PAR derives in part from a desire to move away from the "professional expert" and "technology transfer" models. Whyte uses the examples of traditional organizational research and agricultural technology diffusion respectively to illustrate the value of a more participant-directed approach.

What PAR Isn't

PAR is not another name for a heuristic approach or a license for a "fishing expedition." While emerging from sociology and social/cultural anthropology, it need not be solely ethnographic or qualitative and can employ mixed methods. Any design can be used as long as the evaluation/research is participant-directed (key informants serve as collaborators) and action outcome-driven.

How it's Done

While closely related to the technique "participant observation," other techniques used include study circles, focus groups, Delphi-like techniques, and one-on-one or group interviews. Our research illustrates its use in "Matching Persons with Technologies" and for a postsecondary institution for deaf students.

Some examples

1. There is considerable concern that assistive and educational technologies are being widely recommended without full consideration being given to individuals' predispositions to their use. The desired outcome is heightened attention to the psychosocial aspects of technology use. Assessment instruments have been created from the actual experiences of people who profiled themselves as users or non-users of particular assistive or educational technologies. The PAR approach and methods used to develop the instruments have been described in Scherer (1991a,b,c) and Scherer & McKee (1991). When collecting data on the instruments' reliability and validity, a PAR approach was used again.

2. The Department of Science and Engineering Support at NTID requested a program evaluation. A sample of faculty and students were interviewed and the data was used to create a questionnaire that was distributed to all students. The full report of this multiphase project is in Appendix A.

3. All staff in NTID's Instructional Design and Evaluation department were interviewed about the criteria used in judging the quality of instructional materials (the results are in Appendix B). The data were used to create guidelines/checklists for project planning and development. These guidelines are being used on a continuous basis.

4. Instructional materials needed to be developed for two courses in NTID's Optical Finishing Technology major. Former and current students were given prototype versions of the materials and were asked to participate in discussions regarding modifications to the materials. The full report of these efforts is in Appendix C.

What You Get

The results of the above, as with most PAR efforts, led to consumer-identified changes/modifications. In these examples, the modifications were in a) assessment instruments, b) course content and c) instructional delivery systems.

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Appendix A

Department of Science and Engineering Support Program Evaluation

The Department of Science and Engineering Support (DSES): A Phase 2 Report of Student Perceptions

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January, 1989

The Department of Science and Engineering Support (DSES): A Phase 2 Report of Student Perceptions

Introduction

A multi-phase evaluation of the Department of Science and Engineering Support was initiated during the 1986-87 academic year. The first phase involved the identification of issues of current importance to a) DSES major and service students, b) RIT science and engineering faculty, and c) faculty members of DSES. Intensive, open-ended interviews with eleven cross-registered students (5 majors and 6 service students), five RIT faculty members, and all members of DSES resulted in the identification of many issues that were subsequently incorporated into a questionnaire circulated to all DSES major and service students towards the end of the spring 1988 quarter.

The results of the first phase (hereafter referred to as Phase 1) interviews were presented in a report (Scherer & Binder, 1987) circulated only among the faculty members of DSES who were asked to read the report and identify points they would like to explore further in a questionnaire. Their feedback during subsequent discussions provided the basis for a twenty-item, 8-page, questionnaire (see Appendix) that is herein referred to as Phase 2.

All students receiving support services from DSES during the spring 1988 quarter were asked to complete the

questionnaire and to sign-up for a half-hour small group administration of the questionnaire.

Fifty-six questionnaires were completed, which represents 38% of the total eligible population (76% of eligible majors responded and 19% of eligible service students responded). Respondents had been in a cross-registered program from 1 to 6 years, with the mean length of time being 2.4 years. Thus, there is an over-representation of science and engineering majors as compared to service students.

Respondents were taking a mean of 2.1 science/math/ engineering courses spring 1988 quarter (range=0-6).

Student responses to the questionnaire items are described by topic area. First, the most salient information from the Phase 1 interviews is presented. Second, the data is presented and discussed, and third, responses to the open-ended questions are summarized with selected quotes serving as illustrations.

Tutoring

During the Phase 1 interviews students expressed a general preference for individual tutoring rather than group tutoring. The stated reasons were the communication differences among students in the groups and the possibility that one student will monopolize the group. They wanted to augment group tutoring with individual tutoring. Students also preferred professional tutoring to peer student tutoring because the professional tutors know how deaf students learn best and they

organize and present the material most effectively. Newer students didn't take as much advantage of tutoring as older students. Some students have personal learning styles that they said interfered with the tutoring process. The need to feel independent and being embarrassed because they do not understand the course content kept some students from seeking tutoring.

Phase 2

Question 1. How many times do you usually go for tutoring in science/math/engineering courses?. A year later, when students responded to the questionnaire, the distribution of the mean responses for this group of students across all tutoring options indicates that individual tutoring with a faculty member was the most frequently used tutoring option (see Figure 1). Group tutoring with a student peer tutor was the least frequently used option. Frequency of use of faculty tutors was very different from that reported for use of peer student tutors. As can be seen in Figure 1, the most frequently used tutoring option is "individual with faculty." 69.1% responded that they use this option at least once a week. When asked about their use of group tutoring, 32.7% responded that they use group tutoring with support faculty members at least once a week. Alternately, 27.3% use individual tutoring with a peer student tutor once a week or more and 13.0% used group tutoring with a peer once a week or more.

The respondents were then divided into two categories: a)

student type as being either a science major, engineering major, or service student, and b) first year versus older students. When considering student type, there was no significant difference in the overall frequency of tutoring use among the science, engineering and service students (see Tables 1-3).

Older students reported more frequent use of tutoring than first year students. The utilization of the different tutoring options reflects and is consistent with the tutoring options available to the different student types and with what the students said during the Phase 1 interviews.

<u>If you never or 1-2 times a quarter used tutoring services, why did you not go?</u> In open-ended responses, students responded much as they did during the Phase 1 interviews.

Students preferred faculty tutoring if available. Student peer tutors were seen as being inexperienced and it was more difficult to schedule a time with the peer tutor. Communication and general comfort level were better with faculty tutors. Most seemed to feel that groups were not an efficient use of their time.

Some said they either do not have time for tutoring or don't need it. This was most common with first year and non-matriculated service students. Some selected comments follow:

> "... I have been under a lot of pressure with my school work... and seem to have a lack of time for tutoring. Usually, that caused me to lose my motivation to come for tutoring. Sometimes I was

behind in school work so that I wasn't ready to ask questions yet."

"I do not go for student tutoring. I do go for support faculty member tutoring because that person is available and my schedule matches with that person's schedule easier than with the peer tutor's schedule."

"Group is slow. I prefer a tutor just for me. It is less time-consuming."

"It's harder to think the same as other students who may be more intelligent than me or less. It's uncomfortable..."

Question 2. How much do you need tutoring to be a successful student? Data from the questionnaire indicates that across all student groups the perceived need for tutoring with faculty (either individual or group) is greater than for peer tutoring (see Figure 2 and Tables 1-3). Older students report a greater need for tutoring than first year students. There was a tendency for service students to indicate less need for tutoring than that indicated by either science or engineering students. This is less so if they are older students. Across the board, peer tutoring is less preferred than faculty tutoring. This preference is less apparent for the engineering students but is consistent with the tutoring options available to them. Given the choice, students generally indicate a strong preference for faculty tutoring.

Question 3. How good was the tutoring you actually received? As shown in Figure 1 and Tables 1-3, the patterns of student responses are similar to those given for the questions

about tutoring frequency and need. Students are generally well satisfied with tutoring services, but seem least satisfied with group tutoring with a peer, which is consistent with the options most available to them. There are no significant differences among the student types (science, engineering, service) in their satisfaction. Older students, however, are generally more satisfied than first year students.

Question 4. How would you like to see tutoring services improved? Many students emphasized that they prefer faculty tutors and suggested increasing the hours faculty are available to tutor, hiring more faculty tutors, and eliminating other faculty duties (specifically, teaching). Some suggested that group and peer tutoring times be more flexible and that each group session be held more than once. Those who depend most on peer tutors (mainly the engineering students and service students) suggested that peer tutors be good students, have experience with the course, and be better trained in communication and deaf awareness. One student suggested having more deaf peer tutors because of the extra benefit of having a deaf role model. A few suggested an open, walk-in, no-appointment-needed, tutoring service for a limited time each day. Suggestions were made that sign-up schedules for all tutors be posted more in advance.

Selected student comments are as follows:

"I think peer tutoring would be helpful, especially by a hearing-impaired tutor so that students would see them as role models."

"Hire more peer tutors who are taking the same class with the same teacher. Have more time open to students. Faculty should only schedule their other duties during students' class times and leave open the other times for tutoring students."

"Improve the hearing student tutor's understanding of deafness. Some talk too much and don't realize we're not understanding... They shouldn't be discouraged with writing too much."

"I feel that the services, although limited, are excellent. To improve services, faculty tutoring must expand."

Question 5. Other student comments about tutoring.

Student responses to this open-ended question showed again that they were generally well satisfied with tutoring services and preferred faculty tutors. Yet, while preferring individual tutoring with faculty, they expressed a desire for increased networking, primarily for studying, with both hearing and hearing-impaired peers. The student comments also showed that expertise with the subject matter was not the only factor in determining a good tutor. Students felt a good tutor also needed to be able to communicate well, to have empathy, and to have good teaching skills. Some selected comments are:

"The faculty tutors are very well educated and they usually know the materials presented in the class pretty well. Also, they have lots of sources available for students in their offices."

"Well, it's frustrating to not be able to meet with other students to discuss subject matter. Worse, when the faculty member doesn't have enough time to spend with me."

"...Like to have tutoring during weekends. Sometimes, I need help with my homework."

"I feel I can learn a lot with group tutoring and

group study sessions... I feel that a peer tutor with a group of students would be an ideal way to help develop better study and work habits."

"Tutoring by support faculty members is essential, especially in the first two years of college. It really makes a difference."

"Tutoring was worthwhile. It taught me...things each time and double-checked my understanding to help build up my confidence."

"In the past, I've had only peer tutoring, but now I have a faculty tutor. The peer tutoring wasn't as successful because the peer tutor did not have teaching skills."

"...I'm more comfortable with faculty tutors because they know sign language and communicate well with deaf students. Also, they are more flexible with times and days. They give more time working with deaf students and I know they are motivated."

Notetaking

During the Phase 1 interviews it became apparent that notetaking services were a major issue for the students. Many students said that their notes were incomplete, confusing, hard to read, or received too late to be helpful.

Phase 2

Question 1. How much do you need notetaking? A year later, 85% of the questionnaire respondents said they need notetaking services "a lot" or "very much" with the mean response falling between these two options (see Figure 1). The data in Tables 1-3 show that while science majors consistently reported a high need for notetaking regardless of year, engineering majors showed an increased need beyond the first year.

Question 2. How much do you need notetaking? Unlike Phase 1 respondents, the majority of the students rated the quality of notetaking services as being very good, as the data in Figure 1 and Tables 1-3 indicate.

The mean response to this question is 4.2 (between good and excellent) and when the students were grouped into respondent categories, there were no significant deviations from the mean and no significant differences among the groups.

Question 4. What could we do to improve notetaking services? To improve notes, many students suggested that all notetakers be trained before starting work and that a replacement always be obtained if the notetaker is absent. Students occasionally indicated that there is a need for notes to be available more promptly. Often it was suggested that the notetaker should have already taken the course. One student suggested that either the instructor or DSES faculty clarify and check the notes. Several students felt that more interaction between student and notetaker would help to improve the quality of the notes.

Some respondents felt that the notetaker should write down as much as possible, almost creating verbatim transcripts of the class, while a few preferred the notetaker to condense the notes to only "important" information.

Most students identified legibility, organization, good grammar and spelling, and completeness as characteristics of high quality notes and were the areas in which some notetakers

needed improvement.

Comments indicated that English spelling, English grammar and style of handwriting may be causing some compounded difficulties when the notetaker is an international student.

Question 5. What else would you like to tell us about your notetaking experiences or notetaking needs? Satisfaction with notetaking appeared to be high. Students emphasized that the notes are extremely important to their success. There was some ambiguity as to the characteristics of high quality notes.

Examples of student comments are as follows:

"Most of the notes I have received were good and they helped me to be successful. In fact, I rely almost completely on the notes since I have little time to read the text."

"...Notes were a very good backup source on the material..."

"I have been a successful student with the aid of notes."
"Throughout the first three quarters here at RIT, I've learned to become an active user, using the notes as one of the best support services. I even sometimes take my own notes so I can compare with those of the notetaker."

"I'd like to communicate more with my notetakers. If I have any questions about the notes, I sometimes can't communicate with the notetakers because they are too busy or don't know sign language."

"Notes are the lifeblood of your educational needs."

"Notetakers generally become weary when they have to put down lots of information... But they need to understand that we need as much as we can get."

"The prompt service was great. But the notetaker didn't always take attendance correctly. Make attendance recording the responsibility of the student and not the notetaker."

"Sometimes it's frustrating when the notetaker doesn't get a substitute. Also, the notetaker should have taken the course to know what's important."

Advising

Advising per se was not a topic mentioned often during the Phase 1 interviews, perhaps indicating it was not of major concern. One student pointed out that there was some resentment felt when asked about progress in certain courses.

Phase 2

Question 1. How often did you get this kind of help from DSES? A year later when students responded to the questionnaire, the most frequent kind of advising help students reported receiving was choosing courses and making career plans and registering for courses (see figure 1). Assistance in deciding on a major or decisions around job, co-op, and internship placement were used somewhat less frequently.

When looking at respondents by major type, as in Tables 4 and 5, many service students reported, as would be expected, never having received advising from DSES (even though service students reported a need for DSES advisement). Older service students reported more frequent use of advisement than did first-year service students.

First year science and first-year engineering majors reported more frequent use of advising than the older students, specifically for choosing courses, help with registration, and deciding on a major. As would be expected, older students showed a higher frequency of advisement assistance for

placement. Regardless of year, engineering majors have more frequent advising contacts for choosing courses and deciding on a major than do science majors.

Question 2. How much do you need this kind of help? As can be seen in Tables 4 and 5, engineering majors indicate that their greatest advising needs are in the areas of choosing courses and deciding on a major. Science students report equal advising needs in all areas included in the questionnaire.

Question 3. How good was the advising you received? The data in Tables 4 and 5 indicates that students are generally satisfied with advising.

Question 4. What would improve advising services? Students generally felt that the advising services were good and that the encouragement and information they received were worthwhile. Some felt that advisors were not readily available. Occasionally, a student noted a particular unsatisfactory advising experience where either they did not agree with the advisor's viewpoint or felt the advisor was too hasty in expressing an opinion, did not have enough resources, or did not show adequate concern.

Some specific comments are:

> "Be available more often. Each advisor is assigned too many students. I can't arrange my schedule to see my advisor."
>
> "The counselor is hard to find because she has two offices. So, it would be helpful if we had a full-time counselor."
>
> "Students should be free to select electives in their major."

"You could make efforts to relate to the student to see how the student is doing on a performance-wise basis."

"Improvement is needed to make sure students are on the right path in planning for courses each quarter."

"Advisors should have more experience advising and more options..."

"Give more time for the students needs. Put up weekly schedule earlier. Set up 1-2 office hours when the advisor is free to see students right away if a problem can't wait until the next day."

"You could hold forums getting students with the same major or just interested together to talk about their experiences and courses."

Question 5. What else would you like to tell us about advising? For the most part, students were pleased with advising services and like to have it available as a resource even though they prefer to be independent in their decision-making. Selected comments are:

"Confidential information is to be kept confidential and I appreciate this a lot."

"Helped me in many ways that I didn't realize. Couldn't have done better without this."

"The advisors in DSES are well experienced in helping students decide on their majors, jobs, etc. They are really good advisors and they know what's good for the hearing-impaired."

"Advisors do an excellent job... they are very helpful and extremely encouraging. I am really impressed with them for their patience and optimism."

"I believe it is up to the student to decide how they should plan their schedule... There are some students that can make it in four years, so why have

most of them stay five years?"

"Advising is very helpful, particularly how to start working on a co-op, deciding on courses, and where to get information..."

General

During the Phase 1 interviews, students reported that the heavy academic workload, the pace and the level of the academic work, created stress. Many students reported being caught between the deaf and hearing cultures with little interaction occurring between the two. Also, students mentioned struggling with the issue of independence versus dependence.

For the Phase 2 survey, the above issues were put into questionnaire format.

Phase 2

Questions 1 and 2. What makes it difficult for you to be a successful RIT student? Students were asked to check as many of the seven issues that applied to or affected them. As shown in Figure 1, the most frequently mentioned were: a) The pressures of college life (71% of the respondents), b) the pace and level of the academic work (67% of the respondents), and c) the struggle to be independent while still needing services (55% of the respondents). The data in Table 6 indicates that the frequency of response to these issues was proportionately similar across majors and years of study. The Phase 2 respondents reported few difficulties with the acceptance of their deafness, either on the part of other people or

themselves. When asked what additional problems make it hard for them to be successful RIT students, many and varied additional comments were provided. Some areas of concern are: Lack of accommodation and concern from RIT instructors, interfering family responsibilities, physical and emotional stress, lack of some basic learning skills, and lack of time management skills. For 25% of the respondents, social isolation and loneliness was a concern; when mentioned it was a major concern for that student. Selected comments in these areas of concern are:

> "I set too high standards for myself. Didn't do as well as expected based on my high school or NTID grades."
>
> "I try not to let social isolation bother me. But it feels better to be able to mix."
>
> "Social isolation from the hearing students in my classes is a problem and it's very difficult to cope with."
>
> "The sudden transition from high school puts pressure on me to grow psychologically especially in the social area."
>
> "Organization, planning, study skills, communication, motivation, job finding, time management, health problems..."
>
> "Falling behind. I'm always procrastinating. I don't have enough motivation to feel vitality. I needed better advice about how many credit hours to take and which courses."
>
> "I'm a foreign student and I particularly need support services."
>
> "The pace. Having to spend twice as much time as hearing students to understand."

Questions 3 and 4. The difficulty in making the

transition from college to work. Phase 1 interviews focused on being a student and the student's experiences with the DSES. Consequently, comments did not emerge about post-graduation anticipated difficulties. We included this item in the questionnaire since related concerns were presented by DSES members during preliminary discussions.

The responses to the five options students could check indicated that all options were of some concern to this particular group of students. The need to communicate either informally in discussions with hearing peers or in written format is as important to them as their concern about finding a job in their major. For older engineering majors there is a greatly increased awareness of the importance of communication on the job. Additionally, older science students indicated that although communication and finding a job are important issues,, it will be hardest for them to leave the college environment behind.

When asked what other problems they anticipated going from college to work, three significant areas emerged as important to the students. The students emphasized again communication issues of all types (writing, needing special devices, using the telephone, socializing, etc.). The second area emphasized was their acceptance by co-workers as an equal colleague. The third area was fear of the unknown and fear of failure. Some students mentioned that cooperative work experience has helped them to feel more confident and comfortable with their

anticipated transition to work. The following quotes illustrate this:

> "I've had 5 co-ops, each with a different company, so I wont have any problems."
>
> "Some people may be stereotyped about hearing-impaired people. I may be limited in some cases, mainly because talking on the telephone may be required for the job."
>
> "Being accepted because of my deafness, being informed of duties, cooperation with other workers, use of special equipment like FM unit, hearing aid and interpreter."
>
> "What to expect from a job. I mean I have 'fear of failure.' I'm not sure if I will succeed."

Questions 5-8. Perspectives on requesting DSES services and on registration. During the Phase 1 interviews students mentioned the desire for a balance between flexibility in scheduling and a guarantee of services. The importance was noted for DSES to be clerically accurate in the designation of supported courses and the subsequent follow-up.

Several students suggested the need to simplify the procedures for requesting support services. In general, students had a problem knowing about, and appreciating services. Older students strongly recommended that other students get services immediately in their first year, even though they themselves may not have done this.

From these comments, four questions were written into the Phase 2 questionnaire as follows:

> Question 5. Do you come to the DSES support office before a new quarter starts to request support services?

Seventy-eight percent of the respondents said they 'always' go to the office before the start of a new quarter and request services and 22% either said they' sometimes' or 'never' do. Table 8 breaks the 'sometimes' and 'never' responses into major type and level of student experience. It was apparent that the majority of 'sometimes' and 'never' responders were service students.

Question 6. Do the procedures we have now in science/math/engineering for requesting support services work all right for you?

Ninety-three percent responded yes, that the current procedures work well for them.

Question 7. If you answered no, what can we do to make it work better?

Students suggested having more supported sections so that they are not limited to one particular time. Other comments indicated one student had a problem obtaining interpreters and another felt services had been reduced. One student used this opportunity to express a desire for the same interpreter throughout a course.

Question 8. Is the system that limits you to registering only for supported sections seriously affecting your success as a student?

Sixty-two percent of the students who responded said, "no," the current registration system is not seriously affecting their success as a student and 38% said "yes" it is. As shown in Table 9, those believing it does affect them are primarily older students.

When asked why they felt this way, students indicated that the limitations caused schedule conflicts and resulted in inconvenient schedules. Generally, however, the problems were solved if they sought assistance from DSES. The most significant problem related to limited choice of courses was that students could not always have the teacher of their choice. Students emphasized that the support services are crucial to their success, so if they must take a course that is not supported it is a serious problem. This appears to happen very seldom. Representative comments follow:

> "Causes too many conflicts. Conflicts cause me worry. Convenient times are not usually supported."
>
> "So far I've always gotten support, even if I've signed up for non-supported sections."
>
> "Because I can learn more when I choose a class, since I may know the teacher or students taking the class."
>
> "Not a big problem but it makes it hard to choose courses to fit well into my schedule. Advisor usually can solve the problem."
>
> "...Would like to have college math for NTID only, like NTID sections of Liberal Arts."
>
> "I registered for a supported section and all of the other deaf students were in another undesignated section."
>
> "No interpreter = no comprende;
> one support faculty member = near zero time;
> ineffective student tutor = frustration;
> 3 strikes = I'm out!"

Question 9. Students' perspectives of the important aspects of the support faculty member's job. In the Phase 1 interviews the support faculty role was not clear to students. The students' responses to this open-ended question were all

very individualized, and seemed to reflect what that student needed and desired from their support faculty member. Many students mentioned tutoring and the emotional support, understanding and encouragement that they received from the support faculty as being important aspects of the faculty's role. Selected comments are:

> "...Understanding deafness and how to communicate with the hearing-impaired."
>
> "...To discuss problems that need clarification and pinpoint errors; have group tutoring to promote interest and learn from other peers."
>
> "Understanding the students' needs and then helping them acquire the proper help."
>
> "Encouraging students to learn on their own, adjust to the pace and to learn to use study skills effectively."
>
> "The ability to relate educationally and personally."
>
> "To understand students' needs and weaknesses so that they can better help students to understand concepts; spend a lot of time if needed."

Question 10. What students say they do in the classroom. This question and its response options were directly extracted from comments provided by RIT faculty during the Phase 1 interviews. Students responding to the Phase 2 questionnaire indicate that 88% see instructors outside of class for help and 66% ask questions in class but only 52% participate in class discussions and 46% take their own notes. Students assume more responsibility in these areas across all majors as they mature (see Table 10). Open-ended responses related to other active learning behaviors that students use and reasons for non-use of

those listed generally focused on two major factors: a) a desire to work with and learn from hearing and hearing-impaired peers in a student network and b) a lack of confidence in participating in front of hearing-impaired students and in approaching the classroom instructor. Comments illustrative of these concerns are:

> "I have to admit, I don't ask questions for I am shy and afraid to ask dumb questions. I don't work with the hearing students, either since I feel a wall between me and them and I figured they probably felt the same about me."
>
> "I work with other students in study groups."
>
> "I try to ask other students questions and to get to know them personally. Also, I have had tremendous support from the instructor when asking for help."

Question 11. What would help you to take a more active role in the classroom? Responses showed that 55% of the students valued assertiveness, 38% public speaking training, and 41% informal social events with instructors as aids to increasing their confidence and interaction. The perceived importance of these activities was generally the same across all student groups. Of the 32% indicating a desire for training in taking their own notes, the science and service students showed the most interest (see Table 11). Other assistance students would like to have in order to increase their skills as active learners was:

1. Social activities with hearing students and with tutors to increase interaction.
2. Group study sessions with hearing students.
3. Efforts to increase hearing students and faculty's awareness of deafness.
4. Training in formulating questions, using correct

grammar, developing good writing skills and effectively using the textbook.

Question 12. Which DSES courses have you taken?

DSES faculty noted the lack of attendance in their courses and questioned whether students appreciated the importance of the courses. It was apparent from the Phase 1 interviews that students were uninformed about many services provided by DSES, including those courses. This question was included in the questionnaire asking students about the DSES course offerings as a means of informing them of the existence of the courses. The most frequently taken courses were DOCL (55% of the respondents) and Learning Strategies (25%) followed by Reading and Thinking in Science and Technology (21% of the respondents).

Question 13. Feelings about the DSES course taken.

Comments showed that students had mixed reactions about the DSES courses they had taken. Many found them helpful and valuable. Other students resented having to take them. However, as students matured and looked back, they realized the importance of the courses to their studies. Selected comments are:

"Too easy and not worth taking DOCL... A waste of time because student can ask people the questions quickly about where to go or about what can be offered [from a student who took 3 DSES courses]."

"It really helps because there are a lot of little things that I missed and now it helps me a lot [from a student who took 2 DSES courses]."

"I felt that they were helpful after I finished taking them. I learned much better after taking them than I had before them [took 3 DSES courses]."

"Learning Strategies helped me realize how much more there is to studying and preparation. I felt the Reading and Thinking helped me understand the need to read instructions carefully [took 2 courses]."

Questions 14 and 15. Participation in the Big Brother/Big Sister Program. The Big Brother/Big Sister Program was recently implemented (Fall, 1986) and only 16% of the respondents said that they had participated in it. When asked about the value of the program in Question 15, more students than those who had actually participated in the program responded. Therefore, respondents unfamiliar with the program still gave it a rating. With this skewed response in mind, 34% of the 56 students responding to the questionnaire said that it was valuable.

Questions 16 and 17. Participation in DSES social events. In the Phase 1 interviews DSES faculty questioned the value of continuing social events for students since attendance at these events had been low. The data from the questionnaire showed that the majority of students who said they did not attend these events were first year and service students (see Table 11). When asked to rate the importance of these events, older students rated them as being more important than did first year students (see Table 12).

Question 18. How could DSES social events be improved? When asked how social events could be improved students

suggested scheduling events to be held earlier in the quarter, involving students more in implementation and planning, avoiding time conflicts, providing regularly scheduled events at the same times each quarter, and informing students earlier of scheduled events.

Question 19. Advice for new cross-registered students in DSES. The advice provided by respondents for new students focused on the importance of support services and on balancing the desire for independence with a healthy use of assistance. The following quotes illustrate the force with which the students hold these beliefs.

> "Just not to be too dependent, but also keep in mind that it is good for you to use their services."
>
> "Get all the support you can get because it really helps you to compete with hearing students in your class and helps you to become successful."
>
> "Meet as many faculty members and students as you can at the beginning of the quarter."
>
> "Study hard."
>
> "Make sure that you know your basics and be ready to take on a challenge. You may have to give yourself a lot of time to be successful at RIT, but look at the whole!"
>
> "Don't set your standards too high at first. Just do the best you can and when down, don't give up."
>
> "Have a fighting spirit and do not give up easily. Work hard and the rewards will be great... Have a positive attitude all the time and take advantage of the outstanding tutoring services offered by DSES. I praise their great tutoring sessions!!!"
>
> "Take advantage of the support. You control your own destiny with support rather than the other way around."

"We, the students, should set up a meeting for new cross-registered students so that they can ask any questions before they face new experiences in RIT."

"Work hard; be aggressive in your learning..., get what you want to know. Life here is not the same as NTID."

"Be responsible for your own education. The faculty and staff are resources to use. Be assertive and ask even if you think it's dumb. Create a personal relationship with instructors and support faculty through tutoring so they know you are going beyond what is required. Keep you sights set on your long-term goal and balance frustrations and disappointments with reality."

"Start tutoring earlier!!! Don't wait a until a week before an exam and learn time-management skills."

Question 20. Additional suggestions and comments.

Students were asked to provide comments and perspectives on any aspect of DSES that would strengthen the services offered.

Selected comments are:

"There is not much to improve, but DSES has helped me a lot and without them I could not be still going here."

"I feel DSES is doing a good job trying to meet the needs of the students every way they can and the services should not be cut in any way please!! Without them, I would not have notetakers for my classes and God help me if I don't do well.

"I've heard that some students feel that some staff members have cold shoulders. Some staff just tutor and do not care about what's happening. Perhaps it would be helpful to have staff members relate to the students more and show concern. Sometimes it's nice to know the staff instead of knowing them only as tutors. Also, it's sometimes helpful if the tutor teaches the same material as was taught in lectures. Otherwise, confusions are created."

"Keep up the good work. I feel at home in the Science support office more than any place on campus, including my own support team office. There is a

> tangible spirit of cooperation and respect. The friendliness, availability of faculty and the conference room with library are really pluses in my opinion."
>
> "Get more hearing students involved in helping promote ways to increase better understanding of our academic differences and have them help NTID students in studying with group sessions for working on homework... I tend to feel, this would help us both become used to how to deal with our differences in how we communicate. Thus, it would lead to friendships and better working relationships for future generations."

Summary and Conclusions

Contrary to the Phase 1 interviews which showed a possible problem with notetaking services, students were generally well satisfied with all support services. Quality of services was not an issue with the students. Instead, the problem appeared to be that students could not get enough of what they considered a good thing. The reasons for this appeared to be that students have limited time flexibility and therefore can not always obtain assistance at the times when it is made available. And also that support faculty are often fully occupied. For some students, the traditional methods of delivery of services did not suit their particular needs. There appeared to be as many individual needs as there were students and to satisfy all students an unlimited number of options would be necessary.

Students continue to struggle with a need for independence while realizing a concomitant need for services. Students at different maturity levels appeared to value and use services differently. Experienced students often realized that they

should have used services differently in their earlier years. This was reflected in their advice to new students. It was encouraging also to note that growth and positive attitude changes were occurring as the students advanced in their studies and many students attributed these changes and their success in part to DSES.

Some problems students had with support service appeared to relate not to the quality of services but to the frustration inherent in having to structure their learning in a way different from that of their hearing classmates.

Students preferred individual tutoring with a support faculty member over the other options listed in the questionnaire. This was consistent with Phase 1. At the same time, however, they wanted the feedback they thought they could obtain by working with their hearing and deaf peers. Respondents showed an awareness that there is an attitude component to tutoring and that a good tutor not only provides information but is emotionally supportive as well.

Notetaking, contrary to Phase 1, was also viewed as providing quality services. Students did suggest that notetakers be trained prior to starting work and that delivery of notes be prompt.

There appeared to be no one definition of good notes. No one notetaking style or format will satisfy all students. For example, some students wanted a verbatim transcript while others wanted an outline of only salient points.

The results of this evaluation regarding notetaking were in agreement with a report from the Tutor Notetaker Advisory Group (June 1988) in which it was stated that students rated the quality of notes as good. Other research done at NTID on support services was considered irrelevant for comparison, the reason being either differences in the population or design of the study (For example - Stinson, Saur & Panara 1982).

Pressure of college life and the fast pace of academic work were judged as important concerns by students. For some students, social isolation was a serious concern.

Communication, both oral and written, loomed as potentially a problem for students as they make the transition from college to work.

Students show an awareness that they need to improve not only their communication skills but also their basic skills, study habits and time management. This may indicate that the DSES courses are having an impact.

Students do not categorize advising as a separate service but see it as incorporated in all of their contacts with support faculty and they define the support faculty role very broadly to include many advising components.

From the student's perspective assertiveness training appeared to be a significant need.

Responses to open ended questions throughout the questionnaire often included suggestions which indicated a

desire to work with and learn from their peers. Strong support of the Big Brother/Big Sister program is an example.

Students valued the social events held by DSES but often could not fit them into their schedules. They felt that if the events were scheduled on a regular basis they would be able to plan ahead and attend.

The respondents valued the support services DSES provides and define the role of a support faculty member very broadly. Students strongly emphasized that the warmth, acceptance and empathy which they see as best provided by a support faculty member is important to them.

Recommendations

1. It was recommended in Phase 1 that opportunities for students to interact with peers be increased. One move in that direction which has already been accomplished is the Big Brother/Big Sister program. A further recommendation would be to continue to strengthen the Big Brother/Big Sister program.

The opening of the engineering study room after 5 p.m. also has helped to increase student interactions and responded to a recommendation in Phase 1.

Additional opportunities for students to work together with both their deaf and hearing peers should be developed. This might include among other possibilities establishing study groups, using more deaf peer tutors and providing sign language training for hearing students.

Some of these peer group interactions could be designed to serve as a preparatory environment for communication and interacting on the job.

Potential NTID transfer students might particularly benefit from early involvement in these peer interactions.

2. Assertiveness training could be made more readily available to students.

3. Continue to provide quality support services to the extent that they are now being provided. Look also for opportunities to be creative in making available innovative options to meet the needs of students with a variety of learning styles and who have limited time flexibility.

4. Make students better aware of the many and varied services offered by DSES. Acquaint them with the constraints within which DSES must operate so that their expectations do not become unrealistic and with the philosophy of support services so that they may become more comfortable with their need for services and more discriminating in their use of support services.

5. Continue to solicit student input when considering program changes or modifications. For instance, when students were approached about this evaluation and had the opportunity to have their opinions heard and responded to by DSES, they were very open and responsive and gave much thought to their input.

A research approach in which the salient factors are determined by the affected population and emerge from data

provided by them, rather than the more usual approach of imposing a predetermined structure on the data collection was very useful in identifying areas of importance and concern to students.

Consider the value of this methodology if another program evaluation is done by DSES and if time will permit this more lengthy approach.

6. Considering that students often value support services and other offerings of DSES more as they mature, drive ways to impress upon newer and younger students the value of these services and offerings and to increase their comfort in taking advantage of both academic and social DSES programs.

7. Students define the role of the DSES support faculty member as one in which the students' needs are paramount. Actively seek ways to make available more time for student contact and to reward student centeredness without fostering undue student dependency.

8. Reaffirm a commitment to the maturing nature of an early cooperative work experience and the value this has for instructing students in job expected behaviors and in the need to improve their communication, interpersonal and learning skills.

9. Discuss as a team the department's identity and mission. For example, is the goal for students one of assimilation or one focused on the deaf culture? Once the department's identity and mission are better understood, options related to

operations should become clearer, decisions should be less complex and consensus perhaps easier to obtain.

10. Not all students felt socially isolated at R.I.T. But for those who did, it was for them a particularly disturbing problem. Ways should be explored to assist this group of students to deal with their need to assimilate through counseling and other activities.

FIGURE 1

DEPARTMENT OF SCIENCE AND ENGINEERING SUPPORT (DSES)
STUDENT QUESTIONNAIRE

Year in cross-registered programs MEAN ($\bar{x}$) = 2.4, RANGE = 1-6

Major _____

Number of science/math/engineering courses you are taking this quarter $\bar{x}$ = 2.1, RANGE = 0-6

TUTORING

The Department of Science and Engineering Support (DSES) offers four kinds of tutoring. These are:

A. Individual tutoring with a support faculty member
B. Individual tutoring with a student (peer) tutor
C. Group tutoring (2 or more students) with a support faculty member
D. Group tutoring (2 or more students) with a student (peer) tutor

Please think about your experience in science/math/engineering and answer the following questions. Circle the answer that best shows how you feel.

1. How many times do you usually go for tutoring in science/math/engineering courses?

(FREQUENCIES)

		NEVER	1-2 TIMES A QUARTER	3-5 TIMES A QUARTER	ONCE A WEEK	MORE THAN ONCE A WEEK
$\bar{x}$ = 3.8	A. Individual tutoring with a support faculty member	1 (2)	2 (2)	3 (8)	4 (16)	5 (2)
$\bar{x}$ = 2.3	B. Individual tutoring with a student (peer) tutor	1 (24)	2 (8)	3 (3)	4 (10)	5 (5)
$\bar{x}$ = 2.8	C. Group tutoring (2 or more students) with a support faculty member	1 (16)	2 (11)	3 (10)	4 (5)	5 (13)
$\bar{x}$ = 1.6	D. Group tutoring (2 or more students) with a student (peer) tutor	1 (29)	2 (6)	3 (2)	4 (5)	5 (2)

If you circled (1) never or (2) 1-2 times a quarter, why did you not go for this kind of tutoring?

_____

_____

_____

_____

2. How much do you need tutoring to be a successful student?

(FREQUENCIES)

		NOT AT ALL	A LITTLE	SOME-WHAT	A LOT	VERY MUCH
$\bar{X}$ = 3.9	A. Individual tutoring with a support faculty member	1 (3)	2 (1)	3 (12)	4 (17)	5 (3)
$\bar{X}$ = 2.7	B. Individual tutoring with a student (peer) tutor	1 (11)	2 (12)	3 (12)	4 (11)	5 (3)
$\bar{X}$ = 3.1	C. Group tutoring (2 or more students) with a support faculty member	1 (3)	2 (3)	3 (14)	4 (14)	5 (5)
$\bar{X}$ = 2.1	D. Group tutoring (2 or more students) with a student (peer) tutor	1 (19)	2 (17)	3 (8)	4 (3)	5 (1)

3. How good was the tutoring you actually received?

(FREQUENCIES)

		POOR	FAIR	OK	GOOD	EXCEL-LENT
$\bar{X}$ = 4.3	A. Individual tutoring with a support faculty member	1 (2)	2 (0)	3 (4)	4 (19)	5 (26)
$\bar{X}$ = 3.1	B. Individual tutoring with a student (peer) tutor	1 (6)	2 (3)	3 (11)	4 (16)	5 (2)
$\bar{X}$ = 3.8	C. Group tutoring (2 or more students) with a support faculty member	1 (3)	2 (2)	3 (11)	4 (15)	5 (14)
$\bar{X}$ = 2.5	D. Group tutoring (2 or more students) with a student (peer) tutor	1 (7)	2 (5)	3 (11)	4 (5)	5 (1)

4. What could we do to improve tutoring services?

_____

_____

_____

5. What else would you like to tell us about your tutoring experiences or tutoring needs?

_____

_____

_____

NOTETAKING

Please think about your experience in science/math/engineering and answer the following questions.

1. How much do you need notetaking to be a successful student?

$\bar{X}$ = 4.5

NOT AT ALL	A LITTLE	SOMEWHAT	A LOT	VERY MUCH
1 (0)	2 (2)	3 (6)	4 (12)	5 (36)

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2. **How good are the notetaking services you usually receive?**

	POOR	FAIR	OK	GOOD	EXCELLENT
$\bar{X}$ = 4.2	1 (0)	2 (1)	3 (8)	4 (27)	5 (20)

3. **What could we do to improve notetaking services?**

_____

_____

_____

4. **What else would you like to tell us about your notetaking experiences or notetaking needs?**

_____

_____

_____

ADVISING

The Department of Science and Engineering Support (DSES) offers the following help to students.

A. **Help choosing courses and making career plans**
B. **Help deciding on a major and changing or applying to a major**
C. **Help with registering for courses (add/drop, pre-registration, etc.)**
D. **Help finding counseling when you need it**
E. **Help with job, coop and internship placement**

Please think about your experience in science/math/engineering and answer the following questions.

1. **How often did you get this kind of help from DSES?**

(FREQUENCIES)

		NEVER	ONCE	2 OR 3 TIMES	EVERY QUARTER	MORE THAN ONCE A QUARTER
$\bar{X}$ = 3.1	A. Help choosing courses and making career plans	1 (9)	2 (6)	3 (14)	4 (20)	5 (6)
$\bar{X}$ = 2.3	B. Help deciding on a major and changing or applying to a major	1 (20)	2 (14)	3 (7)	4 (4)	5 (6)
$\bar{X}$ = 3.0	C. Help with registering for courses (add/drop, pre-registration, etc.)	1 (10)	2 (5)	3 (15)	4 (24)	5 (0)
$\bar{X}$ = 2.8	D. Help finding counseling when you need it	1 (13)	2 (6)	3 (15)	4 (13)	5 (5)
$\bar{X}$ = 2.1	E. Help with job, coop and internship placement	1 (27)	2 (4)	3 (7)	4 (7)	5 (4)

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2. **How much do you need this kind of help to be a successful student?**

(FREQUENCIES)

			NOT AT ALL	A LITTLE	SOME-WHAT	A LOT	VERY MUCH
$\bar{X}$ = 3.3	A.	Help choosing courses and making career plans	1 (6)	2 (6)	3 (16)	4 (17)	5 (10)
$\bar{X}$ = 2.9	B.	Help deciding on a major and changing or applying to a major	1 (12)	2 (10)	3 (9)	4 (14)	5 (7)
$\bar{X}$ = 3.1	C.	Help with registering for courses (add/drop, pre-registration, etc.)	1 (8)	2 (11)	3 (14)	4 (13)	5 (9)
$\bar{X}$ = 3.0	D.	Help finding counseling when you need it	1 (8)	2 (9)	3 (17)	4 (12)	5 (7)
$\bar{X}$ = 2.9	E.	Help with job, coop and internship placement	1 (15)	2 (4)	3 (10)	4 (12)	5 (8)

3. **How good was the help you actually received from DSES?**

(FREQUENCIES)

			POOR	FAIR	OK	GOOD	EXCEL-LENT
$\bar{X}$ = 3.7	A.	Help choosing courses and making career plans	1 (3)	2 (3)	3 (8)	4 (25)	5 (8)
$\bar{X}$ = 3.4	B.	Help deciding on a major and changing or applying to a major	1 (4)	2 (4)	3 (12)	4 (17)	5 (5)
$\bar{X}$ = 3.8	C.	Help with registering for courses (add/drop, pre-registration, etc.	1 (1)	2 (7)	3 (11)	4 (18)	5 (12)
$\bar{X}$ = 3.5	D.	Help finding counseling when you need it	1 (3)	2 (4)	3 (15)	4 (12)	5 (11)
$\bar{X}$ = 3.3	E.	Help with job, coop and internship placement	1 (4)	2 (6)	3 (7)	4 (12)	5 (6)

4. **What could we do to improve our advising services?**

_____

_____

_____

5. **What else would you like to tell us about your advising experiences or your advising needs?**

_____

_____

_____

GENERAL

1. **Do any of the problems listed below make it hard for you, personally to be a successful RIT student? Please put a check in front of all that you believe apply to you.** (FREQUENCIES)

   (30) the struggle to be independent while still needing services
   (20) language skills
   (4) your acceptance of your deafness
   (39) the pressures of college life
   (37) the pace and the level of the academic work
   (14) social isolation (being lonely)
   (11) other people's acceptance of your deafness

2. **What other problems are there that make it hard for you to be a successful RIT student?**

   _____

   _____

   _____

3. **What will be hard for you when you go from college to work? Please check all that you believe apply to you.** (FREQUENCIES)

   (17) leaving the deaf college culture behind
   (19) finding a job in your major
   (21) needing to communicate with hearing people on the job
   (14) being independent (on your own)
   (19) writing reports, letters, etc. on the job

4. **What other problems do you think you might have going from college to work?**

   _____

   _____

   _____

5. **Do you come to the DSES support office before a new quarter starts to request support services? Check your answer.** (FREQUENCIES)

   (3) never (1) (9) sometimes (2) (42) always (3) $\bar{x} = 2.7$

6. **Do the procedures we have now in science/math/engineering for requesting support services work all right for you?** (FREQUENCIES)

   (50) yes (4) no

7. If you answered no, what can we do to make it work better?

_____

_____

_____

8. Is the system that limits you to registering only for supported sections seriously affecting your success as a student? (FREQUENCIES)

☐ No (34) ☐ Yes (21) If yes, why? _____

_____

_____

9. What do you think are the most important parts of the support faculty member's job?

_____

_____

_____

10. RIT faculty feel that the NTID students should take a more active part in the classroom and work more directly with their instructor and hearing peers. Which of the following do you regularly do? Check all that apply to you. (FREQUENCIES)

(26) take own notes
(49) see instructor outside of class for help
(29) participate in class discussion
(37) ask questions in class
(15) other - what?

_____

_____

_____

(2) none of the above - Why not? _____

_____

_____

11. **What would help you to do more of the things listed in question 10? Check all that apply to you.** (FREQUENCIES)

(13) training in how to take your own notes
(21) training in public speaking
(31) assertiveness training to gain confidence
(23) informal social events to meet with your instructors
(6) other - please be specific

_____

_____

12. **Please check the courses offered by the Department of Science & Engineering Support that you have taken.** (FREQUENCIES)

(31) Dimensions of College Life (DOCL)
(14) Learning Strategies (Study Skills)
(12) Reading & Thinking in Science (Thinking Skills)
(4) Career & Life Planning
(8) Coop Preview
(1) Colloquia

13. **Please tell us your feelings about the DSES courses you have taken. Please be specific.**

_____

_____

_____

14. **Did you participate in the DSES Big Brother/Big Sister program?**

(9) Yes, I was a _____

(44) No

15. **How valuable is this program?** (FREQUENCIES)

NOT AT ALL VALUABLE	A LITTLE	SOMEWHAT	A LOT	VERY VALUABLE
1	2	3	4	5
(2)	(4)	(6)	(7)	(6)

$\bar{X} = 3.4$

16. **DSES sponsors social events such as picnics, winter party, open "house" for Halloween and Christmas, volleyball, etc. Did you go to any of these events this past year?** (FREQUENCIES)

(20) yes (34) no

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17. How important to you are these events?
(FREQUENCIES)

NOT AT ALL IMPORTANT	A LITTLE	SOMEWHAT	A LOT	VERY
1	2	3	4	5
$\bar{X}=3.2$ (5)	(5)	(8)	(15)	(4)

18. How could we improve these events?

_____

_____

_____

19. Do you have any advice for new cross-registered students in DSES?

_____

_____

_____

20. Please give us your comments or suggestions to help us improve the work done by DSES.

_____

_____

_____

TABLE 1
MEAN RESPONSES TO TUTORING AND NOTETAKING ITEMS FOR FIRST-YEAR STUDENTS

ITEM	SCIENCE MAJOR	ENGINEERING MAJOR	SERVICE
I. A. Freq. of indiv. with fac.	3.2	4.0	2.7
B. Freq. of indiv. with peer	1.0	1.9	1.5
C. Freq. of group with fac.	2.8	2.4	1.8
D. Freq. of group with peer	1.0	1.3	1.0
II. A. Need for indiv. with fac.	3.6	4.1	2.7
B. Need for indiv. with peer	1.8	2.7	1.8
C. Need for group with fac.	3.3	3.0	2.0
D. Need for group with peer	2.0	2.3	1.2
III. A. Satis. with indiv., with fac.	4.4	4.1	3.6
B. Satis. with indiv., with peer	2.0	2.9	3.0
C. Satis. with group, with fac.	3.6	3.7	2.8
D. Satis. with group, with peer	2.0	2.5	1.0
IV. A. How much do you need notetaking?	4.8	4.0	4.0
B. How good are the notes?	4.5	3.9	4.2
n =	6	7	6

TABLE 2
MEAN RESPONSES TO TUTORING AND NOTETAKING ITEMS FOR OLDER STUDENTS

ITEM	SCIENCE MAJOR	ENGINEERING MAJOR	SERVICE
I. A. Freq. of indiv. with fac.	4.5	3.5	4.3
B. Freq. of indiv. with peer	2.8	3.4	2.2
C. Freq. of group with fac.	3.8	2.4	3.1
D. Freq. of group with peer	1.1	2.4	1.8
II. A. Need for indiv. with fac.	4.1	4.3	3.9
B. Need for indiv. with peer	2.9	3.3	2.3
C. Need for group with fac.	3.7	3.0	3.0
D. Need for group with peer	2.8	2.6	1.7
III. A. Satis. with indiv., with fac.	4.6	4.4	4.5
B. Satis. with indiv., with peer	3.3	3.5	2.9
C. Satis. with group, with fac.	4.1	3.5	4.4
D. Satis. with group, with peer	3.0	2.5	2.6
IV. A. How much do you need notetaking?	4.7	4.8	4.1
B. How good are the notes?	4.4	4.0	4.2
n =	10	13	10

TABLE 3
RESULTS OF ANOVA FOR TUTORING AND NOTETAKING ITEMS BY MAJOR FOR ALL STUDENTS

ITEM	SCIENCE MAJOR	ENGINEERING MAJOR	SERVICE
I. A. Freq. of indiv. with fac.	4.07	3.76	3.63
B. Freq. of indiv. with peer*	2.14	2.95	1.79
C. Freq. of group with fac.	3.43	2.52	2.58
D. Freq. of group with peer*	1.07	2.14	1.42
II. A. Need for indiv. with fac.	4.08	4.21	3.56
B. Need for indiv. with peer*	2.58	3.21	2.06
C. Need for group with fac.	3.50	3.05	2.63
D. Need for group with peer**	2.25	2.63	1.44
III. A. Satis. with indiv., with fac.	4.40	4.22	3.57
B. Satis. with indiv., with peer	3.60	3.28	2.57
C. Satis. with group, with fac.	3.40	3.61	3.43
D. Satis. with group, with peer	2.80	2.61	2.14
IV. A. How much do you need notetaking?	4.75	4.52	4.16
B. How good are the notes?	4.44	3.95	4.21
n =	16	20	16

*Significant differences on this item exist at $p < .05$

*Significant differences on this item exist at $p < .01$.

TABLE 4
MEAN RESPONSES TO ADVISING ITEMS FOR FIRST-YEAR STUDENTS

ITEM	SCIENCE MAJOR	ENGINEERING MAJOR	SERVICE
1ST YEAR STUDENTS			
I. A. Freq. with choosing courses	3.7	3.9	1.8
B. Freq. with deciding on a major	2.8	3.2	1.0
C. Freq. with registering	3.5	3.3	1.2
D. Freq. with counseling	3.6	3.2	1.7
E. Freq. with placement	2.0	1.8	1.0
II. A. Need for choosing courses	3.5	3.7	2.0
B. Need for deciding on a major	3.2	3.5	1.7
C. Need for registering	3.5	2.6	2.0
D. Need for counseling	3.4	2.9	2.0
E. Need for placement	2.6	2.8	1.8
III. A. Satis. with choosing courses	3.3	4.0	2.8
B. Satis. with deciding on a major	3.2	4.2	2.5
C. Satis. with registering	3.5	4.0	2.6
D. Satis. with counseling	3.3	3.8	2.8
E. Satis. with co-op placement	3.5	3.0	2.3
n =	6	7	6

TABLE 5
MEAN RESPONSES TO ADVISING ITEMS FOR OLDER STUDENTS

ITEM	SCIENCE MAJOR	ENGINEERING MAJOR	SERVICE
OLDER STUDENTS			
I. A. Freq. with choosing courses	3.5	3.7	2.3
B. Freq. with deciding on a major	2.4	2.8	1.6
C. Freq. with registering	3.3	3.3	3.1
D. Freq. with counseling	3.0	3.4	2.1
E. Freq. with placement	2.4	3.0	1.4
II. A. Need for choosing courses	3.4	4.2	2.8
B. Need for deciding on a major	3.3	3.1	2.4
C. Need for registering	3.2	3.7	3.0
D. Need for counseling	3.2	3.8	2.5
E. Need for placement	3.7	3.6	1.8
III. A. Satis. with choosing courses	4.1	4.1	3.1
B. Satis. with deciding on a major	3.6	3.3	3.0
C. Satis. with registering	4.3	4.1	3.8
D. Satis. with counseling	3.5	4.0	3.1
E. Satis. with co-op placement	3.3	3.8	2.5
n =	10	13	10

TABLE 6

FREQUENCY OF RESPONSES TO OPTIONS IN QUESTION: "WHAT MAKES IT HARD TO BE A SUCCESSFUL STUDENT?"

ITEM	SCIENCE MAJOR	ENGINEERING MAJOR	SERVICE
1ST YEAR STUDENTS			
struggle to be independent	3	2	2
language skills	2	2	3
acceptance of deafness	2	0	2
pressures of college	4	6	2
pace and level of work	3	5	3
social isolation	0	3	1
others' acceptance of deafness	2	0	1
n =	6	7	6
OLDER STUDENTS			
struggle to be independent	5	8	7
language skills	4	6	1
acceptance of deafness	0	1	1
pressures of college	7	10	8
pace and level of work	6	10	7
social isolation	6	2	1
others' acceptance of deafness	2	2	2
n =	10	13	10

TABLE 7

FREQUENCY OF RESPONSES TO OPTIONS IN QUESTION:

"WHAT WILL BE HARD GOING FROM COLLEGE TO WORK?"

ITEM	SCIENCE MAJOR	ENGINEERING MAJOR	SERVICE
1ST YEAR STUDENTS			
leaving college behind	3	2	1
finding a job	2	2	2
needing to communicate	3	0	1
being independent	2	1	4
writing	4	2	2
n =	6	7	6
OLDER STUDENTS			
leaving college behind	5	2	3
finding a job	4	5	3
needing to communicate	4	9	3
being independent	1	0	4
writing	1	8	3
n =	10	13	10

TABLE 8

NUMBER OF STUDENTS WHO SAID THEY SOMETIMES OR NEVER GO TO THE DSES OFFICE BEFORE A NEW QUARTER STARTS

ITEM	SCIENCE MAJOR	ENGINEERING MAJOR	SERVICE
1ST YEAR STUDENTS			
Sometimes	0	0	3
Never	1	0	1
n =	6	7	6
OLDER STUDENTS			
Sometimes	1	2	2
Never	0	0	0
n =	10	13	10

TABLE 9

NUMBER OF STUDENTS WHO BELIEVE THE REGISTRATION SYSTEM SERIOUSLY AFFECTS THEIR SUCCESS

ITEM	SCIENCE MAJOR	ENGINEERING MAJOR	SERVICE
1ST YEAR STUDENTS	3	2	3
n =	6	7	6
OLDER STUDENTS	3	5	4
n =	10	13	10

TABLE 10

WHAT STUDENTS SAY THEY DO IN THE CLASSROOM (FREQUENCY OF CHECKS)

ITEM	SCIENCE MAJOR	ENGINEERING MAJOR	SERVICE
1ST YEAR STUDENTS			
take notes	1	5	5
see instructor	4	6	6
participate in class	1	4	6
ask questions	5	4	4
other	1	0	0
none	1	0	0
n =	6	7	6
OLDER STUDENTS			
take notes	6	4	5
see instructor	9	13	8
participate in class	4	6	6
ask questions	8	9	6
other	5	5	3
none	0	0	1
n =	10	13	10

TABLE 11

WHAT WOULD HELP YOU TO DO MORE IN THE CLASSROOM? (FREQUENCY OF CHECKS)

ITEM	SCIENCE MAJOR	ENGINEERING MAJOR	SERVICE
1ST YEAR STUDENTS			
training in notetaking	4	1	2
training in public speaking	1	4	2
assertiveness training	4	4	3
informal meet with instructors	2	2	4
other	2	0	0
n =	6	7	6
OLDER STUDENTS			
training in notetaking	4	1	4
training in public speaking	4	5	4
assertiveness training	8	8	2
informal meet with instructors	3	6	4
other	3	0	1
n =	10	13	10

TABLE 12

DID YOU GO TO ANY DSES SOCIAL EVENTS?

(FREQUENCY OF CHECKS)

ITEM	SCIENCE MAJOR	ENGINEERING MAJOR	SERVICE
1ST YEAR STUDENTS			
Yes	1	2	0
No	5	5	6
n =	6	7	6
OLDER STUDENTS			
Yes	5	9	2
No	4	4	8
n =	10	13	10

TABLE 13

HOW IMPORTANT ARE DSES SOCIAL EVENTS?

(FREQUENCY OF CHECKS)

ITEM	SCIENCE MAJOR	ENGINEERING MAJOR	SERVICE
1ST YEAR STUDENTS			
Not important	2	1	1
A little important	0	0	2
Somewhat important	0	0	0
A lot important	2	2	0
Very important	0	0	0
n =	6	7	6
OLDER STUDENTS			
Not important	0	0	1
A little important	2	0	1
Somewhat important	4	3	1
A lot important	2	7	2
Very important	1	2	0
n =	10	13	10

Appendix B

Instructional Design and Evaluation Interviews about Quality Instructional Materials

Creating Quality Instructional Materials

Introduction

The Department of Instructional Design and Evaluation at the National Technical Institute for the Deaf (NTID) is composed of graphic artists, photographers, media specialists, instructional developers and an evaluation specialist. Together, these individuals design and develop a wide range of materials for instructional purposes such as workbooks, brochures, informational flyers, posters, and overheads.

The National Technical Institute for the Deaf has a 20+ year history of producing curricular materials for deaf students. Yet, NTID is a relatively young institution and, as such, a creative spirit of experimentation predominates as well as an on-going desire to meet the educational and instructional needs of a student population with diverse learning needs.

Just how students' educational needs are identified, how instructional materials are then developed and designed to meet those needs, is a matter of considerable importance to the entire Instructional Design and Evaluation Department, particularly as these can inform future development activities both at NTID and for the education of deaf college students in general.

Method

During the 1989-1990 academic year, each member of the Instructional Design and Evaluation Department was asked to participate in an interview with the Evaluation Specialist to first, define quality as it applies to the type of design or development activity engaged in by that person and second, to discuss the criteria used by that person in planning and creating a high quality instructional material. A third question asked individuals to identify an area(s) where they would like to have more information or knowledge (for example, specific evaluation feedback that could more directly inform their work).

Each member of the Instructional Design and Evaluation Department was interviewed separately, with the exception of two people who were interviewed together. Each interview was approximately one hour in length. Participants were told the purpose and topics of the interview and were encouraged

to prepare for the interview in any way that they believed would be most helpful to them. They were also encouraged to bring copies of completed projects or ones in-process to the interview.

The Evaluation Specialist/interviewer took detailed notes of the interview content and then divided the notes into groups according to job area. This served to condense the information in a way that allowed for individual anonymity.

Findings

People were asked to describe what they do and then to explain how they make their decisions. To preserve the flavor of their actual responses and the ways in which they were framed and organized, the findings are divided into two primary areas: a) a narrative portion consisting of comments provided during a general discussion of the person's approach to an instructional piece and b) a boxed figure containing points made when they reviewed specific instructional media. In several cases, the content in these two areas overlap.

Media/Production Specialists

Media/Production Specialists produce overheads, flyers, display pieces, brochures, charts and graphs, slides, newsletters, banners and signs, certificates, name tags, T-shirts, and buttons. The following are the combined points made by four Media Specialists:

The job needs to be framed in terms of *The Five W's plus H: Who, What, When, Where, Why and How.*
Who is the client, audience, and particular media specialist.
What is the type of product.
When is it needed? When it will be used, and
Where?
Why questions focus on format and production in light of such concerns as the likelihood of frequent updates.
How will it be used -- once and then thrown out? Will it be completed and returned to us in the mail? Or will it be used multiple times? How realistic and adequate is the client's conceptualization of the project/product?

Several constraints on the project or product need to be considered along with the five W's and H. Some examples of con-

straints are the budget, the number and type of personnel working on the project/product, the time of year the request was presented (e.g. summer requests may need more time because there is less student help available; the same is true for quarter breaks).

The ultimate goal is to be able to take advantage of a wide range of options within the constraints you have. The objective becomes the encapsulation of the five W's plus H while achieving visual simplicity, having narrative brevity while being clever, catchy, dynamic and having all elements relevant to the content. This means knowing the limitations of the available tools, what can and cannot be accomplished, and anticipating as best as possible what the finished product will look like. Quality starts with the five W's plus H and the conceptualization of the design and each subsequent choice made in terms of layout, color, paper, and printing.

Layout. Criteria used in judging the quality of a layout include balance, density of the text, and the use of visuals to create a balanced perspective. The goal is a clean, fresh, crisp, uncrowded look. It's important to use an appropriate, readable, legible typeface. This requires taking into account such things as whether it will need to be read from a distance (a poster) or by one person close up (a brochure). Even though balance is an objective, visual variety is important. Thus, the goal is to achieve proportion among the various visual elements. When there is an interruption of one thought or section to another, those areas need to be defined. The reader should not have to work too hard to understand it or focus on it. The graphic elements should focus attention on what most needs the reader's or viewer's attention.

Color. When it comes to color, it is desirable to select contemporary colors and achieve a look that is alive, and not flat. By "stretching the colors" it can appear to be a multi-color job.

Paper. The choice of paper will affect how colors will print. Paper texture and color can work together to create a dynamic looking product. Added features are the type used, the layout, and the use of stretched colors. The quality of the fit of these elements depends on the print quality.

Printing. Depending on the budget and time constraints, and the number of copies desired, you may go with photocopying or with printing. For print jobs, it's important that the colors match the swatches (in other words, the product matches the idea of what that product was going to look like). You also want even coverage with no show through of the paper. The color should be even throughout, from side-to-side and top-to-bottom. There should not be any ghosting from the previous page. Finally, you want to check to make sure letters (like 'e') and knock-outs aren't filling in.

Before actual production, the mechanicals need to be checked to make sure that everything is straight, that all design elements are securely fastened, that there is no broken type or uneven lines, that there are no missing elements and that there is nothing crooked in the paste-up. The mechanicals should always be clean and neat without smudges or dirt spots for the cameras to pick up. Once printed, you want to make sure that the paper is cut evenly and that the paper has been folded well.

In summary, *quality* frames the entire product and the full process of that product's production. The product should have variety and be dynamic, but balanced and with its elements in proportion. It should visually attract the reader by being inviting and enticing, easy to follow – but not predictable. You also want to give the reader some visual breaks.

Characteristics of a good product	Characteristics of a poor product
¥ The type is fine and readable. ¥ Good use of white space (e.g. use of wider gutters or the space between columns) and line lengths that are visually appealing. ¥ A directional flow of the heading, text and visual ele-	¥ Type too large ¥ Looks awkward and out of balance (looks heavy on the bottom) ¥ Elements out of proportion ¥ Items out of visual sequence ¥ Static graphics ¥ The type size is too big and it makes the layout appear grey ¥ Things compete with one another for attention on the page.

Photographers

As was true for the Media/Production Specialists, the two photographers interviewed gave examples of their products. These include such instructional materials as a display, a photography show, a slide show, a photo of a faculty member for Focus, a photograph that will go into the Mac and become part of a newsletter, and an illustration as part of a publication where it will be produced as a halftone on a photostat camera for reproduction on a photocopy machine.

Photographic quality can be thought of in terms of the quality of the craftsmanship, the presentation, its aesthetic quality and how well it communicates, and the kind of sensory response that it evokes in the viewer. Quality is very personalized. Overall quality achieves a harmony among the above elements.

The quality of the craftsmanshi. This involves balance, composition, and energy. It means that there is a dynamism to it. For our instructional projects, it involves being appropriate for the purpose. It must be technically right. Are people going to be drawn to it? It means having the essential elements while being innovative and exciting. It requires knowing the media – for example, if it's for a slide show, the image needs to be simplified so that the viewer will get the information quicker. You can have all of the essential technical elements but yet have a photograph that's very boring. Now you get into quality of invention and that comes from the quality of the photographer: the person's treatment of the self and the person's treatment of people and how much of the self is put into the creation of that image. It involves a perfection of one's craft, possessing the skills and tapping into an ability that results in a work standing out. Yet there's a point where a higher level of quality isn't appropriate and is a waste of time.

The quality of the communication. We don't know why we respond the way we do. Something just hits us and a feeling is created. It has to do with either the subject matter or the way that subject matter has been seen and captured (for example, the lighting that tells about texture, the time of day, location.) It establishes a mood. It touches many senses and may evoke a memory and call up previous life experiences. "Quality of

communication" is creating a feeling versus just recording an image and it brings knowledge, understanding or insight to someone.

Research questions. Are students able to get the information that they need? How could they get it better? We need their feedback.

It would be great to have an environment fostered where more open conversations occur about our projects from beginning to end. We could all offer responses that might be helpful.

Characteristics of a good photograph. (Two examples of a person sitting at a computer.)	Characteristics of a poor photograph (from Navy of one of our graduates)
¥ Consistency between the photos throughout a project/product. ¥ Use of lighting (to give a three-dimensional effect) ¥ Quality of the preparation (for a photograph of a person at a computer, taking the time to hide the power cords; Getting a high quality image on the terminal as well as of the person). ¥ Getting contrast even when photographing white on white. Having a full tonal range. ¥ A composition where the details show up in the highlighted areas and in the shadows. ¥ The manipulation of exposure time and development, compressing the tones.	¥ The lighting was flat so the photo lacked energy. ¥ There was no directionality ¥ The composition was not good -- there was a computer terminal and the light bounced off it and gave a feedback. ¥ The negatives were underexposed so the prints had no contrast. ¥ No cropping.

Instructional Developers

Existence and performance (adequacy and excellence) are two broad benchmarks that may be applied across each of lthe following instructional development areas:

- instructional content
  - -composition
    - -clarity
    - -logical progression and transition
    - -standard usage
    - -reading level
    - -purpose
  - -comprehensiveness
    - -depth
    - -breadth
  - -accuracy

- instructional design
  - -learning objectives
  - -instructional strategies
    - -topic selection and sequencing (macro level)
  - -chapter/lesson text display features
    - -display of facts, concepts, procedures, principles
    - -text format/displays
      - -use of visuals
    - -use of mathemagencis (learner helps)
    - -incorporation of practice
  - -reference grid
  - -reference features
  - -appeal/motivation
    - -satisfaction
    - -elegance
    - -efficiency
  - -learning objectives/content/testing congruence

- project management
  - -needs assessment
    - -instructional need
    - -marketability
    - -life cycle

-per capita cost
-product specification
-team roles and responsibilities
-communication

- evaluation
  - -product
    - -effectiveness
      - -performance
        - -acquisition of skills and knowledge
        - -efficiency
      - -motivation
    - -satisfaction
    - -use
  - -process
    - -satisfaction
    - -efficiency
    - -time line
    - -secondary influence
      - -teaching strategies
      - -content
    - -innovativeness/creativity

The first benchmark (existence) simply requires an answer to the question, "Was it (inclusion of mathemagenics, satisfaction, and so on) part of the product or process?" The next questions would be, "Should it have been there?" Performance benchmarks ask, "How good was it?" Two levels are then addressed: adequacy (minimal) and excellence (the best possible under any circumstance).

Quality, as it pertains to instructional development, moves closer to an operational definition by addressing existence and performance of instructional content, project management and evaluation features and processes.

Research question: In thinking of hearing and deafness on a continuum, what design structures (text and visual) best support or provide the most effective learning for profoundly deaf students and the other students on the continuum. There may be cells with different types of students and the materials best suited to their learning.

Characteristics of a good design	Characteristics of a poor design
¥ Has utility, accessibility and appeal ¥ Is comfortable to read and looks inviting. It has a good feel about it ¥ Looks streamlined and is clear and succinct ¥ Uses a readable type face ¥ Subheadings, italics serve to organize the material and learning ¥ Appropriate language level ¥ Writing is clear and concise ¥ Use of visuals to show instead of tell ¥ The visuals emphasize the right things and do not distract the reader ¥ Learning is chunked, steps are broken down. ¥ A variety of elements are used with out making the product appear complex. ¥ Visual elements hold the reader s attention and reinforce what s been read ¥ Consistency of style and presentation. No unrelated surprises. ¥ Has a clear table of contents and has effectively used color coding and tabs to organize the material. ¥ It grabs readers' attention, then involves them and gets them to actively participate in the learning. ¥ It s a successful learning tool because it includes review sections and employs strategies that reinforce and build upon the learning.	¥ Contains abstract concepts in need of clarification ¥ Too much information broken into small parts gives a cluttered appearance. ¥ Looks like a project that grew and became too complex. ¥ There are many unnecessary elements used and it ends up confusing the reader. ¥ It has many complex diagrams and looks scary.

Artists

A product can be looked at in terms of three dimensions: utility, execution and aesthetics. The sum total of the above three areas is quality. Yet, quality is a very personal thing and what the client wants can be different from what is personally pleasing or satisfying to the artist. In commercial art, it's a perspective of how the job is done versus how the product emerged. It's almost the same as the difference between inductive and deductive logic. Aesthetics can vary from day to day and can depend upon the mood of the artist. This is what leads to style. For example, depending on the artist's mood, one may select green over pink for a particular product. That in turn may lead to a preference for a particular typeface which may suggest a two-color as opposed to a four-color layout and so on. Another influence on aesthetics is technical execution. Does it attract attention, convey a mood and communicate a message. Looking at the execution of the intended message, then the relevant criteria for quality would be such questions as "was the idea focused and was it communicated successfully -- even if the design may not be technically good?" If you look at something and a question comes to mind about what the artist was trying to do, then something has gotten in the way. But if instead the viewer says, "Isn't that interesting, what does the artist mean?" then you have communicated something -- even if they don't know what. If it makes the viewer think about the content, it's a good design. If it makes the viewer think about the artist, it's not such a good design.

Technical adequacy and executio: There's a lot of tricks and formulas to help an artist sell a product and to commercially communicate something. There are many thing you learn in design class: spatial relationships, balance, the history of what has worked best for certain things, what current elements are in vogue, what current elements/style will tell the message best, what the market will respond to. This foundation leads to preferences and choices regarding typefaces, shapes, sizes and ways to illustrate. There are a million ways all of these can be combined and a good design depends heavily on making the right choices and combinations. But what do you choose and how do you put it together? These are quality considerations. You want the result to be a consistent, harmonious piece, (how the illustration matches with the type and how the various

elements work together, not compete) that is timely and has a feel of having been executed effortlessly but professionally. Just some relevant factors are type density, how the different messages are brought together and how things are separated (the use of space). Graphic design is organizing space – what should be left out and what should be put in and how should the elements be arranged. A grid is an invisible way of organizing elements. How it is all put together, how it communicates it's message within the budget and time constraints, is quality. It takes talent, a lot of skill and a knowledge of how to utilize your past errors and work around constraints. It also has to do with the artist's sense of freedom and flexibility. Does the artist have the time to push the elements? To use contrasting elements to create drama? (Large against small, black against white, patterns against bleakness). Often what you leave out is as important as what you leave in. For example, a word that has been selectively excluded from a sentence grabs our attention.

Usefulness, utility, function. This means being concerned with picking up the tone of the message and illustrating consistently with that. It involves being attentive to the clarity of the information presented, it's orientation and degree of ambiguity. For example, is it a composition that will confuse the viewer if seen from a distance, or just the reverse? A graphic solution must begin with a good idea. Then the consideration moves to how well it was executed. It involves knowing when less is more and when and where to simplify things to clarify the message. It's getting a feel for the message, knowing the audience and communicating to that audience. How you did that is by working with design elements, pushing the elements, and then refining the design for maximum appeal. While there are formulae and techniques, there is always a range of consistency for the design to fit with. You can float in and out of a structure in a way that serves to draw attention and create a dynamic illustration. While a grid or a structure can be an invisible means of organizing, it should not be constraining. Violations of it at times can best point out certain aspects of things.

Aesthetic. Where art comes in is in the intuitive decisions the artist makes about how far to go. If, however, something is distracting, then you apply the reverse process and analyze the piece– are the colors working, are there too many elements, is

it confusing and the viewer does not know where to look first, are the relative sizes of things competing? Is there too much contrast or not enough. The bottom line is getting the information across so that it's clear and visually appealing. To do that, the designer must understand the information , the audience, and have the freedom and flexibility to apply art to it. All parts of a design contribute equally to the whole product and its success. Art becomes, then, the difference between the formula and the expected successful piece and a work of appeal and getting the viewer to stop, and react, and think and have something in them moved. When this happens, then the presentation itself will have a professional quality about it, a seriousness, a caring, and an understanding where the artist comes through.

To summarize, there are four key points to remember:

- know your audience
- know the intended communication (message) and select the appropriate elements (type, spacing, photos, illustrations, spatial relationships, etc.) for that message
- know when to be general and when to be specific (when to be conceptual or literal)
- strive for balance and appropriate emphasis

Research questions

1. Under what circumstances are photographs better than graphic illustrations?
2. What do we miss by not using color?
3. In what ways do the products work for the instructor and the students? In what ways don't they? What are we doing right? Is there a better or more preferred way?
4. NTID has its own subculture. What are the visual idioms common to NTID students and can we use them? Do they structure incoming information in a different way? For example, they are more receptive in the periphery of their vision than many people and we may be able to use this. Start studying this by selecting a small project where the students read a sentence and we present it visually with three visuals representing one idea (graphics, pictures, photos). We can't always repeat success by using what's worked in the past and we may be missing some wonderful opportunities by prematurely eliminating some ideas.

Characteristics of a Good Design	Characteristics of a Poor Design
¥ Message is clear (appropriat emphasis) ¥ Looks dynamic and has energy ¥ Comprehensive, yet timely ¥ Graphic elements work well together (is clear, simple, strong, and in balance) ¥ Involves the viewer (attracts atten tion through size, color, subject matter, etc.) ¥ Appropriate elements ¥ Consistency of thoughts	¥ Too ambiguous and communi cation is clouded. Lacks simplicity. ¥ Too much information to take it ¥ Inappropriate use of typography (too many type styles, letter/line spacing). ¥ Poor choice/balance of elements and space ¥ Lack of consistency

Evaluation Specialist

There are several types of evaluation products or outcomes, and quality considerations differ somewhat among them.

Evaluation of Instructional Materials and Products
For quality considerations regarding instructional materials, one focuses on aspects of a) the product and b) the process that product went through to achieve completion (see "evaluation" section under Instructional Developers).

The Instructional Developers integrate an instructional piece and keep in mind many of the criteria mentioned by the artists, photographers, and media/production specialists. The Evaluation Specialist then addresses questions around the use of the material. Evaluation quality considerations include such concerns as: Characteristics of the students using the piece (English skills, year of study, etc.), intended use of the material and actual use (stand-alone workbook, reference resource, etc.), and user satisfaction (student and instructor).

Evaluation of Processes
While the evaluation of instructional materials is a primary responsibility of the evaluation specialist, another is the evaluation of departmental processes (such as judgements about

quality). Feedback to the evaluation specialist comes in the form of comments, recommendations, etc. by the members of the Instructional Design and Evaluation Department. Here, the focus is on a product, but the evaluation process is that product. Put another way, the product emerged or evolved from an evaluation process (that is, the process of interviewing resulted in this report). Quality considerations for this type of evaluation are concerned with the means used to elicit information. For example, the use of good interviewing techniques (attending skills, clarification, probing, reviewing, etc.), the elimination of distractions (like a tape recorder, lack of privacy, etc.), and giving people the chance to review and correct the Evaluator's interpretation of what was said (the latter serving as the primary indicator of quality).

Evalaution of Programs

Another type of evaluation concerns programming. For example, a summary report of a series of workshops given by Training and Development. This type of evaluation can be used simultaneously in a formative way (to guide modifications in the training programming) and summative manner (to demonstrate to NTID executive management that continued training in this area is needed). Here, quality concerns go beyond a particular product or project and must address such concerns as alignment with Institute priorities, the fair representation of faculty/staff needs, and so on.

Meta Concerns in Evalaution

Finally, evaluation is also concerned with the patterns of or trends in findings over time. No longer product or project specific, this type of evaluation addresses broader issues of learning.

Characteristics of Good Evaluations	Characteristics of Poor Evaluations
¥ Uses an appropriate design ¥ Answers the questions of interest to the audience (does not ask what no one wants to know, does not ask what is known already, does not ask about the unknowable) ¥ Has been designed to yield the desired information in the clearest, simpliest, and most economical way possible ¥ Says only what it legitimately can report ¥ Gives recipients feedback (negative, positive, or neutral) in a manner designed to facilitate improvement and positive change	¥ Used an inappropriate data collection and/or data analysis strategy ¥ Reports information that is ambiguous or potentially misleading without appropriate qualification ¥ Claims more than it should

Conclusion

1. There is a lot of consistency in definitions of what a quality product should look like.
2. The production of a quality product results from a team effort which includes all IDE disciplines.

Quality definitions are dynamic and, as such, the contents of this working paper can be expected to change over time.

Appendix C

Instructional Material Development for Optical Finishing Technology

Optical Finishing Technology Math 1

Basic Characteristics of Spherical and Cylindrical Lenses
Student Workbook

Evaluation Report

M.J. Scherer, B.J. Siegel, and D.J. Peroni

Project Description

The course, Optical Finishing Technology Math 1 is described as follows in Undergraduate Courses 1992-3, Rochester Institute of Technology (p. 196):

> *This course focuses on the rules of transposition, including transposition of lens powers. Students learn to apply mathematical functions, solving for binocular and monocular P.D.s, near-vision prescriptions, and bifocal segment height and inset. The concepts of plus and minus cylinder prescription powers are discussed, and definitions and determinations of lens powers from given base curves, cross curves, and inside curves are taught.*

Instruction is by classroom lectures and laboratory assignments. To assist student learning of the course's concepts, a workbook was developed that would define terms and phrases and depict them graphically. The workbook is a 109 page document divided into seven units, each approximately 15 pages long and having one definition/description or exercise per page. Each definition/description has both a verbal and graphic representation of the concept. Most of the odd numbered pages are blank pages labeled "Notes" for students to record their own comments about that particular concept. The workbook contains both a Table of Contents and an Index.

Prototype Evaluation Questions

The objectives faculty have for the workbook is that the descriptions and exercises included in it will help students to a) understand characteristics of lenses and b) apply their knowledge in the optical finishing laboratory. Key questions for students included the following:

1. Are there definitions/descriptions that are not clear?
2. Are there illustrations that are not clear?
3. Are there terms or concepts that are not included that should be?
4. Are there illustrations that are not included that should be?
5. Is the workbook easy to use?

Evaluation Methodology

Four data sources were selected for addressing the evaluation questions:

1. Former and current students in the course will be asked to go through the workbook and critique it. They will be given copies of the workbook for noting desired changes and will have a week to critique it. Then they will participate in a group interview with the course instructor, instructional developer, and evaluator.

2. For the lab assignment on using the vertometer, former students will come into the laboratory and assist current students in learning to use the vertometer. At the end of the lab, both former and current students participate in a group interview about the usefulness of the workbook in successfully completing this lab assignment. The group interview will involve the course instructor, instructional developer, and evaluator.

3. Student final exams will be analyzed for areas revealing weak conceptual understanding. This will be done by the course instructor.

4. For each lecture and laboratory session, the instructor will note directly in the workbook areas of particular strength and weakness.

The instructor's notes, notes from the student interviews and workbooks, and the exam data will be used by the instructor and developer to go through the Workbook page-by-page and make revisions.

Evaluation Results

Interviews with Selected Former and Current Students

Six students participated in the group interview. Each had gone through the workbook and noted directly on the workbook's pages where they would like to see modifications. The interview proceeded by going through the workbook page by page and asking students to share their comments, which were recorded by the evaluator. After the interview, each student gave their workbook to the course instructor. At a subsequent meeting between the instructor and course developer, the students' comments and notes were analyzed for improving the workbook.

Student feedback at this phase of the evaluation was very specific to definitions/descriptions in the workbook. The attached pages provide examples. In general, students perceived a need in many places for more examples and additional graphics.

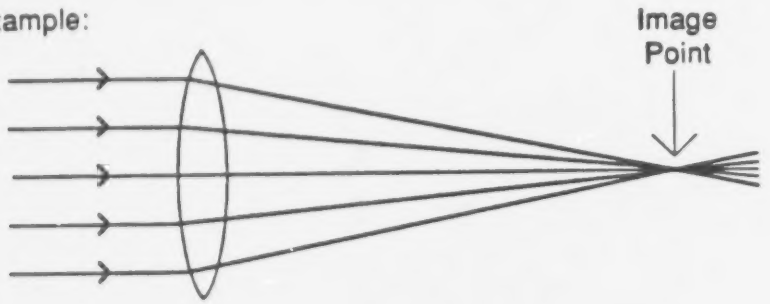
SPHERICAL LENSES

Spherical lenses are the most basic type of ophthalmic lenses.

The surface of the spherical lens has the same curvature in all meridians. It has curves similar to a ball.

Light rays that pass through a sphere lens will converge to a single image point.

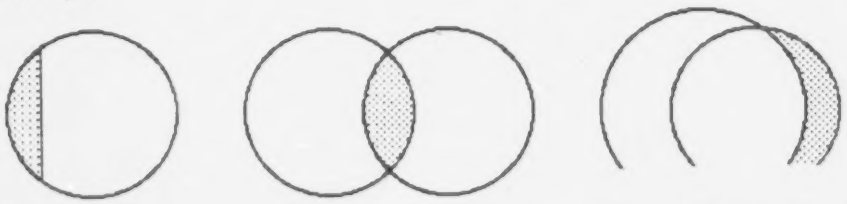
For example:



Positive Sphere Lens

A positive sphere lens resembles the surfaces of a ball.

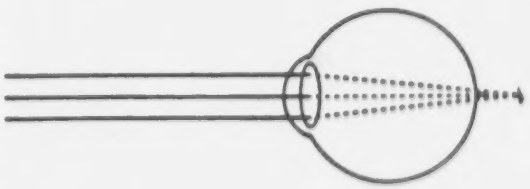
For example:



Shaded area is the lens?

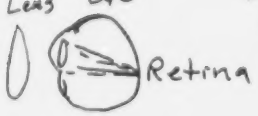
A positive sphere lens is used for the correction of Hyperopia (farsighted).

Hyperopia - Light rays focus behind the retina.

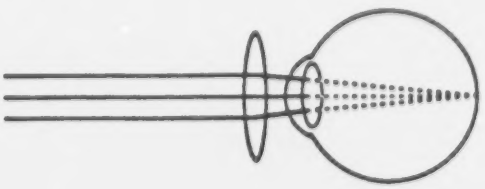


Lens Eye

Maybe label picture



Correction of Hyperopia with positive sphere lens.

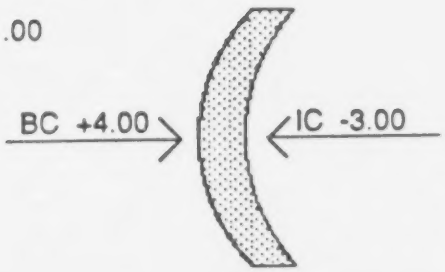


Calculating the inside curve of a semi-finished lens

$F_1 + F_2 = F_T$

F_T Power (total)
F_1 = Front Curve
F_2 = Inside Curve

Rx +1.00



For the lens above the inside curve of -3.00 was calculated like this:

F_1 = +4.00 D
F_2 = ?
F_T = +1.00 D

$F_1 + F_2 = F_T$
$+4.00 + F_2 = +1.00$
$F_2 = +1.00 - 4.00$
$F_2 = -3.00$

I don't think using the word value sounds clear enough.

Thin Lens Formula

Usually the Thin Lens Formula is written

$D_1 + D_2 = D$

The D means Diopter Value.

Sometimes the formula is written

$F_1 + F_2 = F_T$

The F means Focal value

Both formulas are used the same way.

The D means Diopter a unit of measurement used to measure the power of a lens.

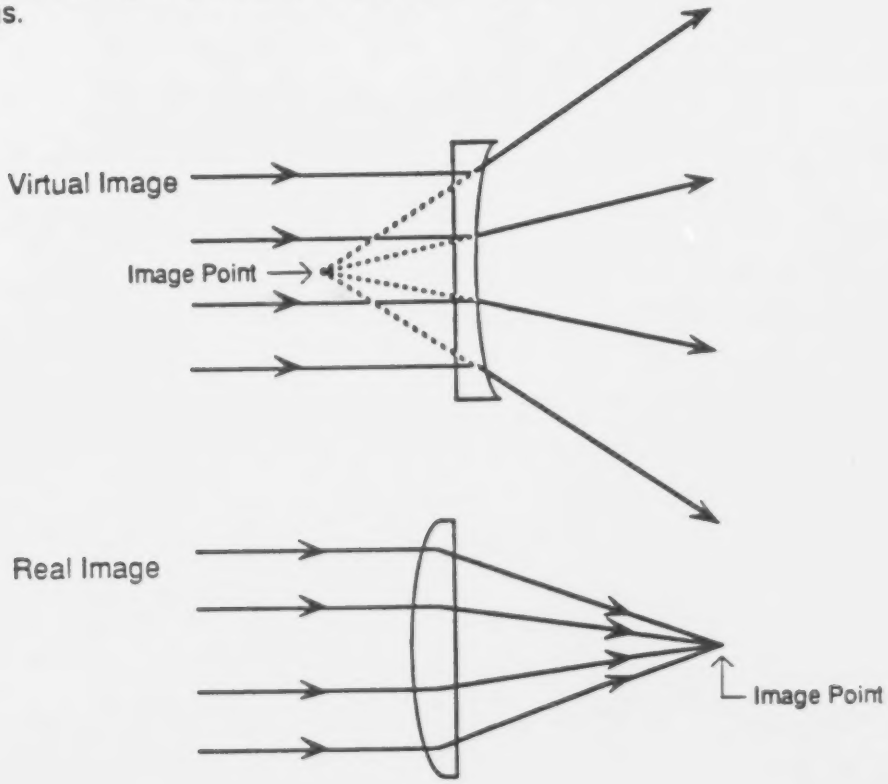
* I feel you should have defined Diopter on pg. 6 where you first start to use it The D symbol would be understood sooner.

Minus Sphere Lens

Minus sphere lenses (negative sphere lenses) are similar to positive sphere lenses, except light rays that pass through a minus sphere lens will diverge.

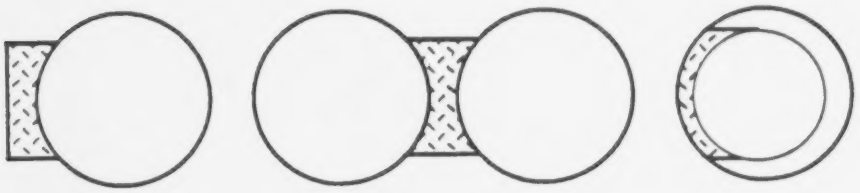
This means that there is no real image point after light rays pass through the lens.

However an imaginary (virtual) image point is produced in front of the lens.



It might be a good idea to label minus sph lens plus sph lens so you don't confuse the 2nd picture

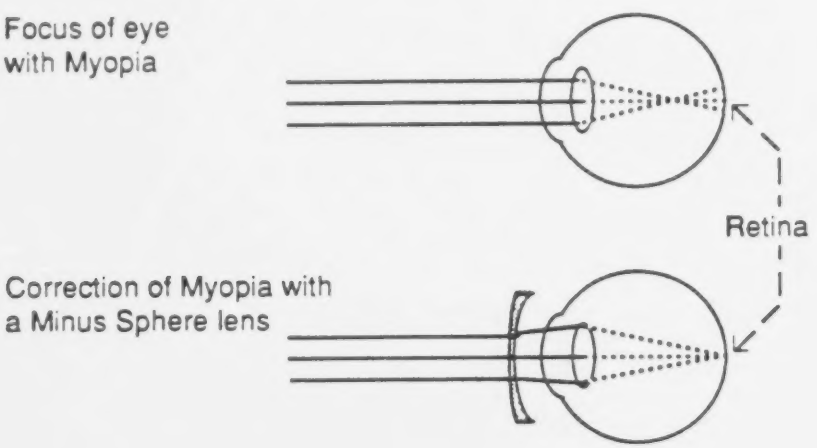
A minus sphere lens also resembles the surface of a ball.



What do these shapes represent?

Same with the other 2

Minus sphere lenses are used for the correction of myopia (nearsightedness).



Define nearsightedness

- able to see clearly at close distance only

Laboratory Observation on the Use of the Vertometer

The feedback from this phase of the evaluation suggested ways to improve both the workbook and the classroom instruction given to students. It became most clear during this evaluation that the workbook in its present form could not serve as a self-instructional tool and is dependent on the instructor's explanation. Regarding the section in the workbook on vertometers, students agreed on the following:

There is a need to clearly show which way to turn the power drum.

More examples and practice with power crosses (F1, F2, FT).

There is still confusion with axis orientation.

Use arrows to show how to rotate to + or - .

In summary, it became evident that there is a need for more examples and practice tests. Students recommend that each of the seven units include a practice test at the end.

Observations from Students' Final Exam Performance

This evaluation resulted in the identification of additional modifications. For example, some definitions and word choices need clarification. One lens diagram was hard for most students to identify. Now the following will be added, "a lens that is thinner in the center is a negative sphere lens."

Students didn't make the connection between power crosses and curves. An illustration will be added to show the relationship.

In teaching the course, more attention needs to be given to math with plus and minus numbers.

Students need to be helped to make conceptual connections.

A good idea would be to append a basic review of mathematical principles. That way it becomes a reference for students as they progress through the workbook.

A discussion will occur between the instructor and the Math Department so that the latter is informed of the difficulties students are having in the mathematical understanding of particular concepts.

Summary of Implications/Recommendations

Product

The evaluation helped identify areas in need of modification or augmentation. The evaluation also revealed the need to help students transfer their knowledge into other coursework.

Overall, the workbook has been determined to be a valuable resource to students and all of the former students wished that the workbook had been available for their use.

Process

The process involved feedback from former and current students as well as the on-going observations of the faculty member involved. Everyone worked together as a team to come up with better ways of illustrating a concept, deriving examples, and creating practice questions. Thus, the evaluation process was both student- and instructor-driven.

Optical Finishing Technology

Evaluation Report

15 October 1990
Marcia Scherer, Evaluation Specialist

The project involved the creation of a workbook for students beginning their major in optical finishing that would serve as a dictionary of terms used in that field and which they would encounter frequently during their course of study here. The product is a 90-page document divided into 18 sections that are contained in a 3-ring looseleaf binder. Each of the 18 sections is approximately 5 pages in length and has an average of four definitions per page. Each word or term is defined verbally and many have accompanying illustrations to aid learning. The definitions appear on the odd-number pages; the even-number pages contain blank blocks across from each definition so that the student can add his/her own notes about that particular word or term.

Method

Four students who are in the last year of their optical finishing program were asked to review the workbook. These senior students were familiar with each word or phrase in the dictionary and, thus, were not provided with the workbook. They had seen the workbook, however, from newer students and asked to have copies. In exchange for complimentary copies of the workbook, they agreed to participate in an evaluation addressing the following topics:

1. List any definition that is not clear.
2. Note any illustrations that are not clear.
3. List any words or terms not included that you feel should be added to the workbook.
4. Indicate any sentences that are unclear, confusing, or are unnecessary.
5. Indicate where illustrations should be added and what they should include.
6. Provide feedback on how easy the dictionary is to use.
7. Provide feedback on the areas opposite the definitions that has been included for note taking and indicate the usefulness of this idea.

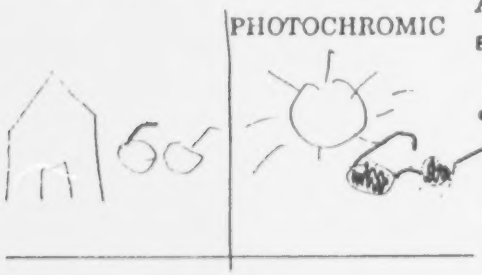
The four students were given one week to review the workbook and answer the above seven questions. On Thursday, October 11, they meet as a group with the course instructor, instructional developer for this project, and the evaluation specialist and provided their feedback.

Findings

The students were unanimous in their view of the workbook as being a very important and useful learning resource and said it was easy to use. They felt that the blank areas for note taking were a good idea and, in fact, had recorded their

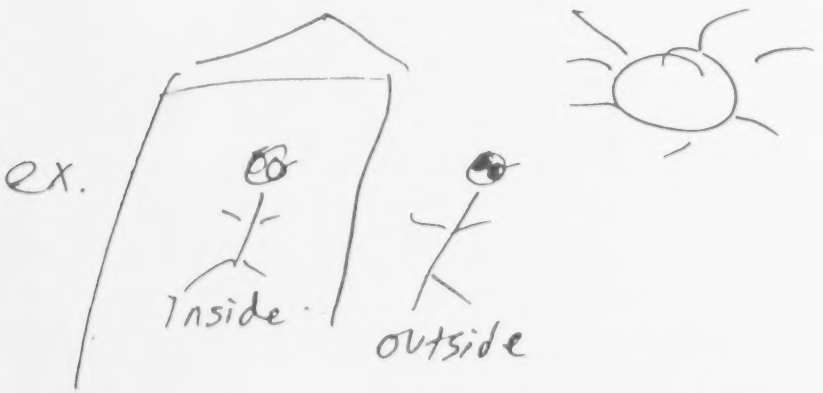
own notes in several of them. For many definitions, they had indicated ways in which they could be modified, expanded, or otherwise made more clear.

By and large, the most significant feedback involved the need for an illustration for each definition. Even such "Lens Imperfection" words as scratch, chip, and crack were determined to be in need of illustration as well as such abstract concepts as "photochromic" (meaning a lens that darkens in color when exposed to sunlight or ultra violet light). When asked how they would like an illustration to look, they were able to provide either a graphic or visual description. The drawings below are how two students would illustrate "photochromic."



A lens that darkens in color when exposed to sunlight or ultra violet light.

- Tim's photochromic lenses are light indoors and darken in the sun.



Conclusions

The methodology employed in this evaluation proved to be fruitful in two ways: First, important feedback was obtained from "experienced users" on ways to improve individual definitions and the workbook in general and, second, an exploratory technique designed to elicit deaf students' visual interpretations of narrative material was attempted and found to be successful. The students' ideas for expanding and clarifying some of the definitions, as well as their ideas for illustrations to accompany definitions, are in the process of being implemented by the instructional developer.